solar spots; to wit, that the times of rotation of the different zones of the solar surface are not the same, and that the equatorial zone makes a revolution in the shortest period, while the duration of a single rotation increases with the latitude. But, while solar spots are only exceptionally present in latitudes greater than $\pm$ 35° (and almost never in latitudes greater than 45°), and while 55° is the highest latitude in which any spot has ever been seen, it follows that, up to the present time, nothing is known of the rotation of the polar regions of the sun. These observations, then, extend our knowledge of the circumstances of the rotation of the sun's surface up to latitude 75°, quite in the neighborhood of the poles."

A comparison between the spectroscopic observations of Professor DUNÉR and those depending on solar spots and solar faculæ, shows that the latter give a velocity of rotation somewhat less than the former. This may be due to the fact that the spots, etc., correspond to depths in the solar atmosphere which are different from that of the layer which gives the spectra which he has observed. This peculiar law of the sun's rotation shows conclusively that it is not a rigid body, in which case every one of its layers in every latitude must necessarily rotate in the same time. It is more like a vast whirlpool where the velocities of rotation depend not only on the situation of the rotating masses as to latitude, but also as to depth beneath the exterior surface. E. S. H.

THE "SQUARE-SHOULDERED" ASPECT OF *SATURN*.

It is known that Sir WILLIAM HERSCHEL (in *Philosophical Transactions*, 1805, page 272 and Plate IX) described a "square-shouldered" aspect to the ball of the planet *Saturn*. The ball appeared to him neither circular nor elliptic, but like "a parallelogram with the four corners rounded off," in latitude 43° or thereabouts. I have lately received, through the kindness of Mr. W. H. PICKERING, a silver print of a negative of *Saturn*, taken at Wilson's Peak February 7, 1890, at $18^h\ 54^m$, G. m. t., enlarged to a scale of 1″ of arc = 1 millimetre, approximately. The dark south polar cap, which has been constantly visible on the planet for some time (certainly ever since the Lick Observatory has been in operation), shows far more plainly in this print than it does to the eye, even, and gives to the southern hemisphere of the planet precisely the "square-shouldered" aspect described by HERSCHEL for both hemispheres. If the northern hemisphere had been marked as the southern

one actually was, HERSCHEL'S drawing of 1805 would have been reproduced. It therefore appears to me that Mr. PICKERING'S interesting photograph is a sufficient explanation of the anomalous figure of *Saturn* described by HERSCHEL. E. S. H.

SCIENTIFIC VISITORS TO THE LICK OBSERVATORY.

Mrs. R. A. PROCTOR has made an extended visit to the Lick Observatory, which was utilized in examining the work of the various departments and in actually studying the principal celestial objects, with special reference to her courses of astronomical lectures, already prepared, and to the preparation of new ones.——We learn that we are also to have the pleasure of seeing Dr. M. WILHELM MEYER, of Berlin, and Mr. COMMON, of London, during the present year. A few such visits will go very far towards breaking up our present sense of physical isolation, which is the only drawback to life at Mt. Hamilton.——Mr. W. W. CAMPBELL, Instructor of Astronomy in the University of Michigan, proposes to spend his summer here in practice with some of the instruments. E. S. H.

THE CONSTANTS OF THE REPSOLD MERIDIAN-CIRCLE OF THE LICK OBSERVATORY.

The constants of the meridian-circle of the Lick Observatory were observed daily, with few exceptions, during the time from October, 1888, to May, 1889, under the supervision of Prof. SCHAEBERLE, in charge of the instrument. The total number of determinations amounts to about one thousand. The observations, together with the temperature, were represented by curves, and the entire material was discussed. The following laws represent the variations of the constants with the temperature during the period of observation:

1. The *variations in the instrument* are greatest when the shutters are open during the night.

2. The *collimation* is quite constant and almost independent of changes of temperature, but shows a systematic decrease of $0^s.002$ a month from December, 1888, to May, 1889.

3. The *level-constant* varies inversely with the temperature, a change of one degree in the latter producing a change of $0^s.025$ in the former. The level-constant increased systematically $0^s.005$ a month for the time from October, 1888, to February, 1889.

4. The reading of the *azimuth-mark* (mire) varies directly with the temperature for micrometer-head west.

5. The reading of the *setting of the south on the north collimator*